

Non Stress Test as a Predictor of Maternal and Fetal Outcome in Patients Presenting with Reduced Fetal Movement at Term

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ABSTRACT

Background: Establishing the predictive utility of Non stress test could be helpful to improve perinatal outcome especially in countries like Nepal, with heavy workload and limited resources. The aim of the study was to assess association between Non stress test abnormalities and fetal outcome in terms of Apgar score and newborn intensive care unit admission rate for patient with decreased fetal movement.

Methods: The study included total 54 women with decreased fetal movement at term without any pregnancy complication not in labor admitted to paropakar maternity and women's hospital, Thapathali, Kathmandu from June 2020 to December 2020. Non stress test was done for 20 to 40 minutes and the readings were categorized in to three groups. The results were compared to see the relationship between normal, suspicious and abnormal Non stress test result in terms of mode of delivery, Apgar score, neonatal resuscitation and need for neonatal intensive care unit newborn intensive care unit admission.

Results: Total 54 cases remained under inclusion criteria were included in this study. Mode of delivery on the basis of Non stress test result shows that 31.48% with abnormal Non stress test had a Lower segment Caesarian section, 1.8% had instrumental vaginal delivery and 14.8% had spontaneous vaginal delivery. While in reassuring Non stress test group 20.4% had spontaneous vaginal, 0% had Lower segment Caesarian section and 1.85% had instrumental vaginal delivery. There is statistically significant relationship between Non stress test result and Apgar score. In reactive Non stress test result only 5.4% required neonatal resuscitation. However, in persistently non-reassuring or abnormal Non stress test result, 62.1% require neonatal resuscitation. Similarly, in reactive Non stress test result none of the neonate required newborn intensive care unit admission. However, in persistently non-reassuring or abnormal Non stress test result 46.1% neonates require newborn intensive care unit admission. There were 9 neonatal mortalities from abnormal Non stress test result.

Conclusions: We concluded that the Non stress test is a good predictor of maternal and fetal outcome detecting fetal hypoxia already present or likely to develop in patient presenting with reduced fetal movement in term pregnancies without complication.

Keywords: Decreased fetal movement, maternal outcome, fetal outcome, NST

INTRODUCTION

Obstetricians are concerned with the early recognition of fetal distress during labour in order to avoid an adverse fetal outcome.¹ Non stress test (NST) is the most widely

used diagnostic technique to monitor fetal health during pregnancy and labor. Establishing the predictive utility of NST could be helpful to improve perinatal outcome especially in countries like Nepal, with heavy workload and limited resources. The available

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method of surveillance are intermittent auscultation, continuous electronic fetal heart rate monitoring, invasive technique of fetal blood gas analysis. The NST is a short continuous electronic fetal heart rate recording for 20 minutes. The present study correlated the result of NST with neonatal outcome in non-high risk patients with reduced fetal movement not in labour at term pregnancy. The aim of the study was to assess association between NST abnormalities and fetal outcome in terms of Apgar score and NICU admission rate for patient with decreased fetal movement.

METHODS

This prospective study included consecutive 54 non high risk patients presenting with reduced fetal movement at term pregnancy, not in labour, admitted to PMWH, Thapathali, Kathmandu from June 2020 to December 2020. I have calculated the incidence by taking preliminary data from six months. At that time out of 12000 obstetrics admission in six months of B.S. 2075, there were 440 were admitted with complains of reduced fetal movement. So incidence of decreased fetal movement is 3.6% in PMWH. At 95% ($z=1.96$) confidence interval using the Fisher's formula below for estimating proportions, the study needed 54 participants.

Study population was consisting of all women who are admitted with decreased fetal movements and who fulfills the inclusion.

Reduced fetal movement was decided by complaints of reduced fetal movement less than 10 times per day by patient. Post term pregnancy was not included in the study. NST was done for 20 to 40 minutes. The result of the NST test were categorized in to reassuring/reactive, suspicious and non-reassuring / non-reactive group as per the Royal College of Obstetrician and Gynaecologists (RCOG) guidelines for the interpretation

of CTG tracing.² The results were compared to see the relationship between normal, suspicious and abnormal NST result in terms of mode of delivery, Apgar score, neonatal resuscitation and need for neonatal intensive care unit (NICU) admission.

Patient with reassuring NST test were monitored by intermittent auscultation for one minute, every 4 hourly. Those having suspicious trace were placed on continuous monitoring for 90 minutes. In those with non-reassuring fetal heart rate tracing, late deceleration and variable decelerations were taken as fetal distress. Delivery was consequently hasten by operative or instrumental intervention depending on the stage of labour. The fetal outcome measured in the form of APGAR score at 1 and 5 minute, need of resuscitation and admission to neonatal intensive care unit (NICU) and neonatal mortality.^{3,4}

RESULTS

Total 54 cases remained under inclusion criteria, were included in the study. Mode of delivery on the basis of NST result shows that 31.48% with non-reassuring NST had LSCS, 1.8% had instrumental delivery and 14.8% had vaginal delivery comparable to the findings in a study by Syeda.R.M.et.al.³ While in reassuring NST group 20.4% had vaginal, 0% had LSCS and 1.85% had instrumental delivery. There is significant relationship between NST result and APGAR score, as in the studies done by Daly N et.al⁴ and by Syeda.R.M.et.al.³ In reassuring NST results only 5.4% require neonatal resuscitation. However in non-reassuring NST result 62.1% required neonatal resuscitation which was higher than in a study done by Daly N et.al.⁴ Similarly in reassuring NST results none of the neonates required NICU admission. However in persistently non reassuring NST result, 46.1% require NICU admission much more than that in a study by Harrington et.al.⁵ There were 9 neonatal mortality from non-reassuring NST result.

Table 1. CTG result and mode of delivery (n=54).

Mode of delivery	Result						p-value
	Reassuring		suspicious		abnormal		
	No.	%	No.	%	No.	%	
Instrumental vaginal	1	1.85%	3	5.5%	1	1.8%	0.00
Caesarean	0	0%	2	3.7%	17	31.48%	
Induced vaginal delivery	11	20.4%	11	20.4%	8	14.8%	
Total	12	22.2%	16	29.6%	26	48%	

Commonest mode of delivery is vaginal. In 55.5% had a induced vaginal delivery, 35.1% had a LSCS and 9.25% had instrumental vaginal delivery. Majority of indication for LSCS was abnormal NST i.e. 17(89.47%) of patient presented with reduced fetal movement.

Table 2. CTG result and Apgar score at 1 minute interval (n=54).

Apgar Score at 1 min	Reassuring		suspicious		Abnormal		p-value
	No.	%	No.	%	No.	%	
<7	11	20.3%	16	29.6%	26	48.1%	0.00
≥7	1	1.85%	0	0%	0	0%	
Total	12	22.2%	16	29.6%	26	48.1%	

Overall 53 (98.1%) neonate had Apgar score < 7 at 1 minute.

With reassuring NST 20.3% and 29.6% with suspicious NST, Whereas with non-reassuring /abnormal NST 48.1% had Apgar score less than 7 at one minute

Table 3. CTG result and Apgar score at 5 minute interval(n=54).

Apgar Score at 5 min	Reassuring		suspicious		Abnormal		p-value
	No.	%	No.	%	No.	%	
<7	3	5.5%	16	29.6%	26	48.1%	0.00
≥7	9	16.66%	0	0%	0	0%	
Total	12	22.22%	16	29.6%	26	48.1%	

Overall 45(83.3%) neonates had Apgar score < 7 at 5 minute.

With reassuring NST only 5.5% had <7 APGAR score at 5 min , Whereas with suspicious NST 29.6% and non-reassuring /abnormal NST 48.1% had <7 APGAR score,all had Apgar score less than 7 at five minute.

Table 4. CTG result and neonatal resuscitation required after delivery (n=37).

Neonatal Resuscitation Required	Reassuring		suspicious		Abnormal		p-value
	No.	%	No.	%	No.	%	
No	10	27%	4	10.8%	3	8.1%	0.00
Yes	2	5.4%	12	43.2%	23	62.1%	
Total	12	32.4%	16	43.2%	26	70.2%	

Overall 37(68.5%) neonate required resuscitation after delivery.

With reassuring NST 5.4% neonate requires resuscitation whereas with suspicious NST 43.2% and non-reassuring / abnormal NST 62.1% neonate required resuscitation after delivery.

Table 5. CTG test result and Admission to neonatal intensive care unit.

Admission to NICU	Reassuring (n=12)		Suspicious (n=16)		Abnormal (n=26)		p-value
	No.	%	No.	%	No.	%	
No	12	100%	8	50%	14	53.85%	0.01
Yes	0	0%	8	50%	12	46.15%	
Total	12	100%	16	100%	26	100%	

Overall, 20 (37.03%) neonate need admission to NICU. With reassuring NST none of the neonate required NICU admission, whereas with suspicious NST 50% and non-reassuring / abnormal NST 46.15% neonates need NICU admission.

DISCUSSION

It is a dynamic screening test for the stage of oxygenation of the fetus on admission. It assesses the placental supply by checking the response of fetal heart during the phase of temporary occlusion of the utero placental blood supply during uterine contraction.¹

Moore and Piacquadio established levels of fetal movements in a pilot study of 100 women, reporting that the time taken to count 10 movements while resting on their left side in the evening was 20.9 minutes (+/- 18.1 minutes). Within 90 minutes 99.5% of women normally counted 10 movements in this way, therefore 2 hours was identified as an alarm limit.⁶⁻¹⁰ However, with the large normal inter- and intra-individual variability in FM, no specific alarm limit has so far proven superior to the mother's subjective perception of reduced fetal activity.¹¹⁻¹³ The only definition of RFM based on focused counting data in a total population that has subsequently been tested as a screening tool in a total population, is the rule of "ten movements within 2 hours" in a study by Moore and Piacquadio.¹⁰ This is currently the method of FMC recommended by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.¹¹

Out of 54 patient presenting with reduced fetal movement 12(%) had reassuring NST, 16(%) had suspicious and 26 (%) had Persistent non-reassuring/Abnormal NST.

In a study done by Rahman, where 77% was reactive, 23.1% are equivocal/abnormal.

Out of 50 patient presenting with decreased fetal movement shows 90% reactive NST, 4% non-reactive NST and 6% abnormal FHR at admission NST test.³

There is significant relationship between NST results and mode of delivery as evidenced by present study where none of the cases underwent intervention in the form of operative (LSCS) and 1.8% instrumental delivery with reassuring NST result, however 31.48 % underwent LSCS and 1.8% instrumental delivery with abnormal NST.

Incidence of vaginal deliveries was more common when the test was reactive compared to operative deliveries whereas operative deliveries were more common when NST was abnormal.

In a study done by Daly about 44% of patient with reduced fetal movement and abnormal or persistently non-reassuring NST delivered by cesarean section, 40.7% had normal vaginal delivery and 14% had instrumental delivery whereas in reassuring NST group only 15% is delivered by cesarean and 62.4% delivered by normal vaginal delivery and 19.1% had instrumental delivery.⁴

Similarly in a study done by Chew incidence of cesarean section rate is higher in patient with reduced fetal movements and additional antenatal complication than patient with reduced fetal movements alone i.e. 16.9% vs. 12.1% (P<0.001). In this study 19 out of 24 cases i.e. about 80% cases of critical fetal reserve or abnormal NST delivered by Cesarean section.⁶

There is significant relationship between NST result and Apgar score. In reactive NST result only 20.3% had a Apgar score less than 7 at one minute, and 29.6% with suspicious NST, however in 48.1% had Apgar score less than 7 at one minute in persistently non-reassuring or abnormal NST result. Similarly in reactive NST result only 5.5% had a Apgar score less than 7 at five minute, however in suspicious 29.6% and in persistently non-reassuring or abnormal NST result 48.1% had Apgar score less than 7 at five minute.

In a study done by Daly shows that 94% had normal neonatal outcome and only 6% had abnormal neonatal outcome with APGAR score less than 7 at 1 minute in 18.5% in abnormal or persistently non reassuring NST group and 3.6% in reassuring NST group (p<0.001) where as 3.7% in abnormal or persistently non reassuring NST and 0.6% in reassuring NST had APGAR score less than 7 at five minute.⁴

In reactive NST result only 5.4% require neonatal resuscitation. However in suspicious NST 43.2% and persistently non-reassuring or abnormal NST result,

62.1% require neonatal resuscitation. Similarly in reactive NST result none of the neonate required NICU admission. However in suspicious NST 50%, and persistently non-reassuring or abnormal NST result, 46.1% neonate require NICU admission. There were 9 neonatal mortality from abnormal NST result.

In a study done by Daly in total 29 (6%) of 497 had an abnormal neonatal outcome, requiring neonatal resuscitation $n = 11$, NICU admission $n = 25$. Of which 33.5% required admission from abnormal or persistently non-reassuring NST and 5% from the reassuring NST group ($P < 0.001$), with average stay (days) per patient in NICU is 21 (0.5-81) in reassuring NST group and 12 (2-63) days in abnormal or persistently non-reassuring NST group.⁴

Similarly in a study by Harrington shows that neonatal intensive care unit admission rate in patient presenting with reduced fetal movement was 5.8%.⁷

The commonest age group presenting with reduced fetal movement is between 25-29 years i.e. 24 (44.4%). In a study done by Syeda, majority i.e. 90% of the women were between 21-30 year group.³ In a study by Hameed shows majority of patient with reduced fetal movement is between 31-36 years which comprises 34% of total study population.⁸

CONCLUSIONS

We concluded that the NST is a good predictor of maternal and fetal outcome detecting fetal hypoxia already present or likely to develop in patient presenting with reduced fetal movement in term pregnancies without complication. There is significant relationship between NST result, mode of delivery, neonatal resuscitation and NICU admission. This showed that the babies from reactive NST required less resuscitation and NICU admission than babies from non-reassuring or abnormal NST.

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CONFLICT OF INTEREST

None.

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